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IN THE UNITED STATES DISTRICT COURT
DISTRICT OF UTAH CENTRAL DIVISION

ClearPlay Inc., Plaintiff, vs. DISH Network LLC, DISH Network Corp., EchoStar Corp., and EchoStar Technologies L.L.C., Defendants.	Case Number: 2:14-cv-00191-DN **EXPERT DECLARATION OF PROF. NICK FEAMSTER, Ph.D.** Judge David Nuffer Magistrate Judge Brooke C. Wells (FILED UNDER SEAL)

I, Nick Feamster, declare as follows:

1. I have been retained by ClearPlay, Inc. to opine on how Defendants Dish Network, LLC and EchoStar, LLC infringe U.S. Patent Nos. 7,577,970; 7,526,784; 7,543,328; and 6,898,799 (the "Asserted Patents"). This declaration is based on my educational and professional experience and expertise, my understanding of the Asserted Patents, a review of the Defendants' documents and source code, and my personal and professional understanding of the technology at issue. If called to testify, I can and would do so competently as to the matters stated herein.

I. PROFESSIONAL AND EDUCATIONAL BACKGROUND

2. My qualifications and a list of publications that I have authored are set forth in my curriculum vitae, which is attached as Exhibit 1 to my Declaration.

3. I received my Ph.D. in Computer Science from the Massachusetts Institute of Technology in 2005, where I completed a dissertation entitled *Proactive Techniques for Correct and Predictable Internet Routing*. In 2001, I completed a Master's of Engineering in Electrical Engineering and Computer Science at the Massachusetts Institute of Technology; my Master's thesis, entitled *Adaptive Delivery of Real-time Streaming Video* and written from 2000 to 2001, developed new Internet transport protocols to deliver streaming video over Internet paths with variable packet loss. I received my bachelor's degree in Electrical Engineering and Computer Science at the Massachusetts Institute of Technology in 2000.

4. My thesis developed a new network transport protocol for streaming video—the Selectively Reliable Real-Time Transport Protocol (SR-RTP)—that improves the performance of streaming video over an unreliable communications medium such as the Internet. The transport protocol exploits the nature of compressed video to mitigate the negative effects of variable network bandwidth and delay commonly seen on the Internet. The loss of data packets on the

Internet can be detrimental to the quality of streaming video because of dependencies in compressed video. In the presence of packet loss, SR-RTP selectively retransmits only the most important data in the video stream (typically, data from the anchor frames, or so-called "I-frames") to limit propagation of errors across a group of pictures (GOP) in a compressed video stream.

5. My thesis also developed a new "TCP-friendly" congestion control algorithm for streaming video transmissions—adapted from the general family of binomial congestion control algorithms—to achieve a much more constant transmission rate than conventional congestion control algorithms, such as the Transmission Control Protocol (TCP) facilitate. TCP congestion control uses a so-called "additive increase/multiplicative decrease (AIMD)" congestion control algorithm, which results in large oscillations in transmission rates—particularly on high-bandwidth links—and hence a greater need for buffering at the receiver. My thesis developed a congestion control algorithm that was provably fair to competing TCP traffic flows without inducing the large oscillations in transmission rates that TCP induces.

6. Currently, I am a Professor of Computer Science at Princeton University, where I have served on the faculty as a full professor since January 1, 2015. Prior to my employment at Princeton University, I was a Professor of Computer Science at the Georgia Institute of Technology, where I served on the faculty from January 1, 2006 to December 31, 2014.

7. Among other recognition for my research, in 2009, I received the Presidential Early Career Award for Scientists and Engineers (PECASE), which the President of the United States awards to fewer than 100 scientists every year. I received this award for my contributions to cyber-security, particularly in the development of new machine-learning based techniques to identify, detect, and predict various forms of unwanted Internet traffic—such as spam, botnets,

and phishing techniques. Many of the techniques that I pioneered have become the standard industry approach for data-driven cybersecurity. In 2017, I was inducted as a Fellow of the Association for Computing Machinery (ACM), recognizing my career achievements as one of the top 1% of all professional computer scientists. I received this distinction from ACM "for data-driven studies of Internet security and Internet censorship."

8. In addition to my educational background, I have experience in the streaming video industry. While working at Hewlett-Packard Laboratories in 1999, I invented new techniques to transcode between streaming video formats in real-time. My work involved analyzing the structure and format of MPEG video streams and writing software that could identify anchor frames ("I-frames") and derivative frames ("P-frames" and "B-frames") and discard the derivative frames to lower the bitrate of the resulting stream. I wrote the software for the prototype transcoder in the C programming language, performed the associated evaluation, and published a paper on my work.

9. When I worked at Hewlett-Packard Laboratories on video transcoding technologies, both engineers with whom I worked had Ph.D.s in electrical engineering. At the time that the invention was developed (and presently), it was common for cutting-edge work on video signal processing and codecs to be presented at academic conferences, including *ACM Multimedia* and others. Much of the work at these venues was being performed by Ph.D.s.

10. Many of the kinds of problems confronted in the art at the time were quite similar to those pertaining to the claimed invention. To elaborate slightly on the example that I provided, one topic that received—and continues to receive—attention is the problem of real-time transcoding: changing the encoded format of a video "on the fly," often without decoding and re-encoding. This topic, which I published papers on in the late 1990s, involved analyzing a video

stream and determining segments of the stream to drop or omit in a target stream of a lower bitrate.

11. My master's thesis involved developing network transport protocols to transmit a video stream from a video server to a client in ways that allowed for higher packet loss rates in portions of the video stream that would be more resilient to loss. This topic area—often referred to as "unequal error protection" in the literature—invariably involved examining portions of the video stream and assigning higher or lower priority to different parts of a video stream based on the type of video frame that was being encoded, and optionally skipping retransmission or decoding of lower priority video frames.

12. My research in these areas—which were being widely researched around the time of the invention—involved technologies that are relevant to the claimed invention, namely, parsing a video stream and making decisions about prioritization, dropping, and skipping based on the region of the video stream under consideration.

13. In addition to my direct experience in video streaming, I have worked at companies throughout the networking industry since 1997. I was an early employee and the lead technical engineer at LookSmart, an early search engine, where I wrote the company's first web crawler and indexer in 1997. I subsequently worked at Bell Labs on telephony software (1999); at AT&T on network management software (2001–2005), and at Verisign (2015) on network measurement and analysis tools.

14. Additional information regarding my professional, educational, and litigation consulting experience is provided in my CV.

II. <u>RATE</u>

15. My rate for this matter is $500 per hour. My compensation is not dependent on the content of my report or the outcome of this case.

III. SUMMARY OF OPINIONS

16. My opinions are as follows:

a. A person of ordinary skill in the art has an undergraduate degree in electrical engineering or computer science (or a related field) with four or more years of practical experience working with signal, video, or data processing or a master's degree with at least two to three years of experience. My opinion of a person of ordinary skill in the art is consistent with what was found in the *inter partes* reviews regarding ClearPlay's patents.

b. As I explain in detail below, a person of ordinary skill in the art with knowledge of the Asserted Patents, the relevant art, and IPR history understands that a navigation object is information that enables a video playback system to identify a specific action that should be taken at a certain place in the video stream. Specifically, a person of ordinary skill in the art understands that a navigation object requires a start time, a stop time, and a filtering action. Importantly, the Asserted Patents do not limit the format of a navigation object to a specific data structure, format or file. That is, the start and stop times and filtering action of a navigation object could be stored in one specific file or spread across multiple files. From the viewpoint of a person of ordinary skill in the art, there is an insubstantial difference between storing all the information in one data structure versus multiple associated data structures. This construction is the same one adopted by the Patent Trial and Appeal Board (PTAB) during the IPR proceedings against the Asserted Patents. My opinion is supported further by the plain language of the patent claims, the specifications, and prosecution history.

c. Redacted

d. Redacted

e. Redacted

Redacted

f. *Redacted*

[redacted]

g. [redacted]

IV. ASSUMPTIONS

17. I have been asked to provide my opinion on whether the technology developed by Defendants constitutes infringement—either through literal infringement or under doctrine of equivalents. Below I state the assumptions on which I base my opinion in this declaration and the legal framework that I have been asked to use to analyze the facts of this case.

18. From previous orders from Judge Nuffer, I understand that claim construction is an issue of law that the courts decide. I also understand the following [1]:

[1] *FatPipe Networks India Ltd. V. XRoads Networks, Inc.*, No. 2:09-cv-186 TC, 2012 WL 918909 (D. Utah Feb. 9, 2012); *Mud Buddy, LLC v. Gator Tail, LLC*, No. 2:08-cv-0972-DN-PMW, 2012 WL 2595061 (D. Utah July 4, 2012); *FatPipe Networks India Limited v. XRoads Inc.*, No. 2:09-cv-186-DN, 2015 WL 12778762 (D. Utah Sept. 22, 2015); *Novatek, Inc. v. Sollami Co.*, No. 2:11-cv-00180, 2013 WL 1831995 (D. Utah April 30, 2013).

a. Claims *"define the invention to which the patentee is entitled the right to exclude," and claim terms "are generally given their ordinary and customary meaning."*

b. A court is to determine *"the ordinary and customary meaning of undefined claim terms as understood by a person of ordinary skill in the art at the time of the invention."*

c. "Common words, unless the context suggests otherwise, should be interpreted according to their ordinary meaning."

19. I understand and assume that to construct claim terms, it is appropriate to start from the intrinsic evidence: the claims, the specification, and the prosecution history. The construction that I use for my determination derives directly from the patents and the prosecution history, which I have reviewed in preparing this declaration. I understand that: *"The construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction."*

20. I also understand that while claims are read in light of the specification, limitations from the specification should not be read into the claim. Specifically, and importantly for my determination, I understand that the described invention should not be limited to the specific examples or preferred embodiment found in the specification.

21. I also understand that courts may also rely on extrinsic evidence in construing claims. Extrinsic evidence is "all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." Additionally, "within the class of extrinsic evidence, ... dictionaries and treatises can be useful in claim construction." Consultation of extrinsic evidence is appropriate to ensure that [the Court's] understanding of the technical aspects of the patent is not entirely at variance with the

understanding of one skilled in the art. My aim in this declaration is to provide the Court information to aid its understanding of the patent from the perspective of one skilled in the art.

22. For literal infringement to exist, I understand that the accused device must exactly mimic the claimed invention. Importantly, "[i]f even a single limitation is not present in the accused device, literal infringement does not exist as a matter of law." In the context of this declaration, I apply a claim construction for a **navigation object** to determine whether the Defendants' AutoHop feature literally contains a navigation object. I do so by defining the meaning and scope of "navigation object;" I will then apply the claim as construed to the Defendants' AutoHop technology to determine whether it has a navigation object.

23. I understand that even if an accused product does not literally infringe a patent, it can do so under the doctrine of equivalents. My understanding is that to determine whether there is infringement under the doctrine of equivalents, the accused product or feature must perform substantially the same function, in substantially the same way, to achieve substantially the same result. I have been asked to render an opinion concerning whether the AutoHop feature has a navigation object according to doctrine of equivalents. In this declaration, I will analyze whether the AutoHop feature performs substantially the same function, in substantially the same way, to achieve substantially the same result, as the "navigation objects" referred to in the claims.

V. PERSON OF ORDINARY SKILL IN THE ART

24. I have been asked to discuss navigation objects from the perspective and understanding of someone who is of "ordinary skill in the art." I understand that a person of ordinary skill in the art is a hypothetical construct that represents the skill and understanding of an ordinary person in the particular technology of the claimed invention. It is my understanding that courts look to the following factors to determine a person's level of skill in the art:

- The inventor's educational background;

- the kinds of problems confronted in the art;
- solutions found previously;
- the level of sophistication of the technology;
- the speed of innovation in the art; and
- the educational level of active workers in the field.

25. While I understand that all of these factors may not apply in every case, I will briefly comment on the level of skill in the art with respect to the claimed invention.

26. It is common for workers in the field to have at least an undergraduate level of education (as the inventor does), and possibly higher degrees as well. Typically, developing and understanding these technologies requires some knowledge of network protocols and video encoding formats. It would be common for a person working in this field to have an undergraduate degree (or equivalent experience) in electrical engineering, which provides some exposure to video compression and coding formats through signal processing coursework; or computer science, which provides exposure to network protocols. The concept of skipping over certain portions of video is a general concept that communications majors such as the inventor could conceive, especially given his several years of industry experience in video content delivery. Occasionally, I have interacted and worked with developers and designers of video compression technologies who have a partial undergraduate education but several years of direct industry experience.

27. Performing work in this area requires software development skills, knowledge about network protocols and systems (including the design, interpretation, and implementation of protocol specifications), and domain knowledge about video formats. Such a body of knowledge might be attained with a bachelor's degree in computer science (or electrical engineering or

related field) with fours years of experience in the industry, or a master's degree with two to three years of experience in the industry.

28. Development in the area of video content delivery is steady and rapid. Innovation related to video playback and delivery systems, as well as the standard video compression formats (e.g., MPEG), have undergone many revisions and improvements over a relatively short timeframe. The past decade has seen tens of revisions to the compression standard alone, for example. Top research conferences in the area that I am familiar with, including *ACM Multimedia* (which focuses on multimedia applications and delivery) and *ACM SIGCOMM* (which focuses broadly on communications networks and protocols, including those that deliver video to consumers), see a significant number of innovations every year, across a broad range of topics, from performance to security. The standards themselves are typically quite complex, comprising hundreds of pages of standards documents defining compression formats and methods. The reference codec implementations are typically tens of thousands of lines of code, but new inventions and improvements can often happen quite rapidly. For example, the inventions related to my work at Hewlett-Packard Laboratories on video transcoding involved a few thousand lines of code, developed in a timespan of months. Typically, standardization and hardware design (e.g., optimizations for ASICs) take longer—timescales for these types of innovations can be on the order of years—but software innovations, such as those we are considering in the Asserted Patents, progress at a far more rapid rate—often on the timescale of months to quarters.

29. Based on this definition, I am a person of ordinary skill in the art.

VI. CLEARPLAY'S PATENTS

30. I will now summarize the four patents under consideration. The first two patents that I discuss concern **navigation and playback of multimedia content using navigation objects**:

- *US 7,577,970 "Multimedia Content Navigation and Playback" Matthew T. Jarman.* (August 18, 2009; Filing Date: March 7, 2005) (the '970 patent)
- *US 6,898,799 "Multimedia Content Navigation and Playback" Matthew T. Jarman.* (May 24, 2005; Filing Date: October 23, 2000) (the '799 patent)

31. The '970 patent describes a mechanism to monitor the current play position in multimedia content, such as a video stream, and compares the play position against a set of navigation objects for the associated video stream. A *navigation object* has a start position, a stop position, and an associated filtering action. When the play position falls between the start and stop positions of a particular navigation object, the playback process performs the associated filtering action (e.g., skip, mute) associated with that navigation object (Ex. 2 to Defendants' Motion for Summary Judgment (hereafter "Ex. to MSJ") at 14:55–63; Ex. 1 to MSJ at 15:3–11).

32. The patents describe this process and envision that it might be applied in the context of digital video streams, analog signals (e.g., television), or audio streams. The specific context described is one where an output device, such as a monitor, is connected to a computing device that has local permanent storage and is also connected over the network to other computers (Ex. 2 to MSJ at 9:29–40; Ex. 1 to MSJ at 9:34–45). Navigation actions such as playback, skipping, and muting take place during the decoding process, by which the source of the content in a certain format (e.g., MPEG video) is translated into a format that the output device can understand. The navigation software ("navigator") may be either co-located with the decoder or remote; it communicates with an object store, which stores metadata about the video,

including the navigation objects for the associated video (Ex. 2 to MSJ at 6:22–29; Ex. 1 to MSJ at 6:15–29).

33. Upon playback, the navigator retrieves the navigation objects associated with some particular multimedia content. The playback device checks whether the configuration specified in the navigation object (e.g., the model or version of a set top box) matches the specification in the navigation object. The navigator only proceeds if the navigation object corresponds to the configuration of the particular device that is executing playback. If the configuration matches, content is decoded and transferred to an output device, which could be (for example) a graphics card that drives a video display. At this point, the navigator updates the position code of playback and compares that code against the associated navigation objects. If the position code falls within the start and stop positions of a navigation object, the navigator performs the associated filtering action, such as skipping or muting the content.

34. Figure 4A in the '970 and '799 patents describes this process in slightly more detail. I have included that figure below.

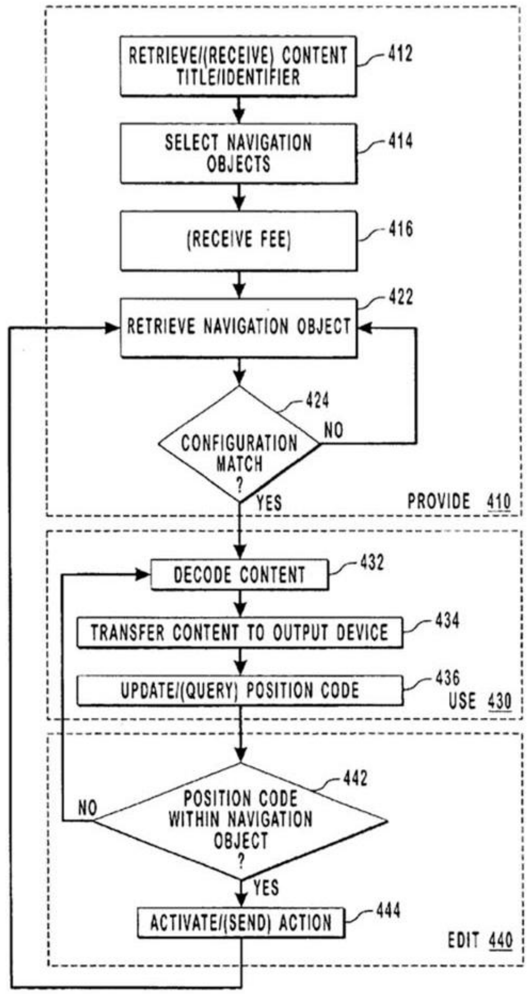

FIG. 4A

35. As described in the Asserted Patents (Ex. 2 to MSJ at 14:65–15:17; Ex. 1 to MSJ at 15:14-35), playback involves continuous decoding of content (Block 432), transferring that content to an output device (Block 434), and—importantly—updating the position code reflecting the current playback position (Block 436). Once the position code is updated, the navigator compares the current position with the navigation objects for that stream. If the position code falls between the start and stop code for a navigation object ("Position Code Within Navigation Object", Block 442), then the navigator initiates the associated action (Block 444), which could include a skip, mute, or reframe action for that segment of video.

36. In the '970 patent, navigation objects refer to portions of a multimedia stream that should have some type of filtering action performed on them. The patent describes three example filtering actions: skip, mute, and reframe (i.e., enlarging media content in the frame so that certain objectionable material is cropped from view) (Ex. 2 to MSJ at 5:1–52). The patent also describes several other types of actions (e.g., fading in or out) to make the viewing experience more seamless in the event of a filtering action.

37. The '970 patent describes improvement over prior art based on the fact that navigation objects can be generated, stored, and distributed separately from the multimedia content, in contrast to previous methods that required creating a segment index at the time of the creation of the digital media format (Ex. 2 to MSJ at 3:38–4:30).

38. The construction and claims in patents '799 and '970 are similar. The claim under consideration in patent '799 (Claim 12) is similar to the claim in patent '970, with the main difference being in the first three limitations of claim 12 (Ex. 1 to MSJ at 21:58–22:7). The main difference between the two claims concerns how navigation objects are loaded. The '799 patent specifies a mechanism whereby the playback system loads the object store directly onto a consumer playback device, whereas the '970 patent makes no assumptions about where the object store is located: it could be, for example, located on a remote server, from where the consumer playback device downloads a set of navigation objects.

39. The '970 patent has several additional claims beyond those enumerated in the '799 patent. Specifically, Claim 6 in '970 specifically provides for the multimedia content to be one or more channels of audio; Claim 9 discusses loading the object store into the memory of a consumer computer system; Claim 10 describes a process of using the title of the multimedia content to retrieve the appropriate object store for the appropriate content, given the presence of

object stores for different multimedia content (e.g., different videos); and Claim 15 specifically provides for the multimedia playback mechanism to be a DVD player.

40. The other two patents under consideration concern the delivery of navigation objects to consumer playback devices:

- *US 7,543,318 "Delivery of Navigation Data for Playback of Audio and Video Content," Matthew T. Jarman.* (June 2, 2009; Filing Date: April 17, 2007) (the '318 patent)
- *US 7,526,784 "Delivery of Navigation Data for Playback of Audio and Video Content," Matthew T. Jarman.* (April 28, 2009; Filing Date: May 3, 2005) (the '784 patent)

41. These patents describe the process by which a navigation object may be delivered from a server (where navigation objects are stored) to a playback system that is co-located with the consumer system. The description of the navigation objects in the '799 and '970 patents afforded the possibility that the navigation software that governs playback of the video stream might reside at a remote server, or it could be co-located with the consumer system (e.g., a set-top box or other video playback device that resides in the consumer home) (Ex. 2 to MSJ at 10:46–49; Ex. 1 to MSJ at 10:53–56).

42. In the case of the '784 and '318 patents, where the navigation software resides with the consumer system, the software needs a mechanism for communicating with a remote object store where the navigation objects are stored. This patent describes navigation objects and how they are used to skip, mute, or reframe content using much of the same language as the '970 patent.

43. The claim specifically under consideration in the '318 patent is Claim 23, whereby the navigation object also comprises a configuration identifier. In the described system, decision block 424 "determines whether the configuration identifier of a navigation object matches the configuration of the consumer system" (Ex. 12 to MSJ at 14:34–36).

44. Beyond the previously described inventions, this step facilitates the storage of navigation objects at a remote server with the navigation software itself at the consumer device: Because the navigation objects are not co-located with the navigation software, it is possible that all navigation objects in the object store may not apply to a single consumer device, such as particular software, firmware, or hardware running on a given set top box. Matching the configuration identifier allows a navigator that is co-located with a consumer device to download navigation objects from a remote server and use a configuration identifier to apply only the navigation objects that apply to that device.

45. Claim 3 of the '784 patent provides that the consumer system could be adapted to disable or ignore one or more of the navigation objects. Consumer playback may need to ignore a navigation object (and its associated filtering action) for a number of reasons. For example, a user may explicitly disable filtering. The patent describes two ways by which disabled objects are ignored: the consumer playback device may eschew downloading the objects in the first place, or the playback device may ignore disabled navigation objects that it has already downloaded.

46. The construction of navigation objects is essentially the same under each patent: the construction defines a navigation object to have "a start position, a stop position, and a filtering action to be performed on the portion of the multimedia content that is defined by the start position and stop position" (Ex. 2 to MSJ at 4:49–52; Ex. 1 to MSJ at 4:46–49; Ex. 12 to MSJ at 4:54–57, Ex. 11 to MSJ at 4:50–53).

VII. CONSTRUCTION OF "NAVIGATION OBJECT"

47. Central to Defendants' motion is the definition of a *navigation object* in the IPR, and whether the Dish AutoHop product has a navigation object according to that definition. In

this section, I discuss what a person of ordinary skill in the art would understand to be a navigation object, based on the IPR and patent proceedings.

48. The patents describe a navigation object as assisting a computer system in identifying which content in a video stream should be skipped, for instance, versus played back to the output device.

49. A person of ordinary skill in the art understands that a navigation object is information that enables a video playback system to identify a specific action that should be taken at a certain place in the video stream. Such information should comprise:

· A start point and stop point in the video stream, thus identifying a segment of the video stream.

· The corresponding action that the playback system should take for that segment of the video stream (e.g., skip, mute).

50. The patents explain how a video playback system would use the data in such navigation objects: the playback system compares the "position code" in the video playback against the start and stop points in a set of navigation objects and performs the action associated with that navigation object if the position code falls within the start and stop point of that object. According to the specific language in the '970 patent (Ex. 2 to MSJ at 4:47):

> *The present invention includes the creation of navigation objects to define portions of the multimedia content that should be filtered. Each navigation object contains a start position, a stop position, and a filtering action to be performed on the portion of the multimedia content that is defined by the start position and stop position…The navigation objects are placed in an object store. There is no particular limitation on the format of the navigation objects and the object store. When playback reaches a portion of the multimedia defined by a particular navigation object, the navigator activates the editing action assigned to that navigation object.*

51. The '970 patent (Ex. 2 to MSJ at 11:63) also specifies a navigation object as follows:

> *Each navigation object defines when (start and stop) an [sic] filtering action should occur for a particular system and provides a description of why the navigation object was created. Start and stop positions are stored as time codes, in hours minutes:seconds:frame format; actions may be either skip or mute; the description is a text field; and configuration is an identifier used to determine if navigation object applies to a particular consumer system.*

52. Defendants argue that because the original patents use the term "object," that all components of the navigation object should reside in a single data structure. Defendants' Motion for Summary Judgment establishes this more narrow construction of a "navigation object" by saying that the object itself "must contain the actual defined filtering action" (Defendants' Motion for Summary Judgment at 6), suggesting that under a more narrow construction of a navigation object, the associated action must be specified in the same place as the start and stop action.

53. Yet, a person of ordinary skill in the art recognizes that there are many embodiments of a navigation object as described in the patents. The specifications in the Asserted Patents also recognize many possible embodiments. For example, the '970 patent specification (Ex. 2to MSJ at 11:55–62) explains that a navigation object may be a single file, stored in one or more databases; the construction also envisions that other data management systems might be used.

54. A person skilled in the art would understand this to mean that the essential characteristics of a navigation object are the start time, the stop time, and the associated action and that the *representation or structure* of this object in a software implementation could naturally take many possible forms. The patents list examples of possible embodiments, and a

wide range of embodiments are possible. For example, consider a set of database tables where start and stop times could be stored in one location, and the associated action is stored in a separate table. The two tables could be linked with a common identifier (sometimes called a "join key"); such a join could even be represented as an abstraction such as a database "view." The fact that the pieces of information are stored in separate tables or locations on disk is immaterial to the three critical pieces of information that comprise the object itself.

55. An important aspect of the definition of the navigation object concerns how it is used, as described in '970 (Ex. 2 to MSJ at 14:55) [emphasis added]:

> *A step for filtering multimedia content includes the acts of comparing the updated position code to the navigation object identified in block 422 to determine if the updated position code lies within the navigation object* ***and the act of activating an filtering action when appropriate.*** *If the updated position code is not within the navigation object, decoding continues at block 432. But if the updated position code is within the navigation object, the filtering action is activated. Following activation of the filtering action, the next navigation object is retrieved at block 422.*

56. The described use of a navigation object describes the comparison of a position code to the start and stop times specified by the navigation object and performing a filtering action if this condition is met (i.e., the position code falls between the start and stop times). The "when appropriate" condition suggests that the patent envisions implementations of a navigation object whereby the skip action could be interpreted from information that is contained in the navigation object, even if that information doesn't spell out the action as shown in exactly the same format specified in the patent. In fact, the definition of a navigation object in '970 (Ex. 2 to MSJ at 4:53) envisions a variety of possible encodings and formats [emphasis added]:

> *The navigation objects are placed in an object store.* ***There is no particular limitation on the format of the navigation objects*** *and the object store. For example, the object store may be a file, such as a database and the navigation objects may be records within the database.*

57. In addition to envisioning a variety of *formats*, the '970 patent (Ex. 2 to MSJ at 11:55–62) also envisions that the navigation objects might be *stored* in a variety of ways [emphasis added]:

> *Within object store, navigation objects may be stored as individual files that are specific to particular multimedia content, they may be stored in one or more common databases, or some other data management system may be used.* ***The present invention does not impose any limitation on how navigation objects are stored in object store.***

58. In the IPR proceedings, the USPTO settled on a definition of a navigation object as follows. (1) a start and stop time in a video file, thus identifying a segment of the video; and (2) a corresponding action (e.g., skip) to perform for that segment of video. The IPR proceedings discuss the board's findings that the prior art of Abecassis defined start and stop times, but not a filtering action (Ex. 16 to MSJ at 6). ClearPlay also defined the navigation object as these three pieces of information—the start time, the stop time, and the corresponding action (*Id*. at 39:11-15):

> *That's how a navigation object works. It's going to monitor the position code to see if it's reached the start position of a navigation object. When it does, it will look for those other two pieces of associated information, how long do I do this and what do I do? That's a navigation object.*

59. ClearPlay also explains that the navigation object need not define the skip action in the same place; in fact, it doesn't matter where the action is defined (*Id*. at 63:5–15) [emphasis added]:

> *Again, it's 'provided at the level of group of frames.' And again, that's all about the provision, when you send it. That envelope example I used, that's saying you're sending it in different envelopes. You could send it at the tenth envelope and have that apply to the next five frames. That's what it's saying. It's not saying anything about what the filtering information is or how it works, it's just saying that's when you send it. With Clearplay's invention, you could certainly provide the navigation objects in the video*

> *header,* ***you could provide them at the group of frames header, you could provide them with the frame, you could do it all the same way, but it doesn't matter*** *...*

60. Certain of the patents and IPR proceedings specify that a navigation object reside in an object store, but *not necessarily that these actions all be specified in the same place* in a file or data structure. Both the patents and the IPR proceeding define the navigation object based on the information that the navigation object contains and the functionality that it enables, without either specifying or constraining the format of the navigation objects themselves.

61. Furthermore, based on the description of how the playback system uses the navigation object (Ex. 2 to MSJ at 14:55–64), a person of ordinary skill in the art understands that if the default filtering action is to skip, the corresponding start and stop times can be in *any* file, as long as that file is explicitly identified as being used for a skip, by means of a unique identifier or type value. From the view point of a person of ordinary skill in the art, there is an insubstantial difference between storing all the information in one data structure versus multiple associated data structures.

VIII. <u>THE HOPPER AND AUTOHOP</u>

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97. AutoHop and the navigation objects described in the Asserted Patents perform:

- substantially the same function (identifying segments of video that should be skipped during playback, thus enabling skipping a segment of a video),

- to yield substantially the same result (communication to a set top box specific information about segments that should be skipped during playback of the video stream).

98. The difference between what the code does and what is described in the patents and IPR is insubstantial.

I declare under the penalty of perjury of the United States that the foregoing is true and correct.

Executed this 1st day of September 2017 in Princeton, New Jersey.

By________________________________

Nick Feamster